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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,105	08/25/2003	Tony M. Brewer	10970696-3	7372

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HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
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EXAMINER
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PEIKARI, BEHZAD

ART UNIT	PAPER NUMBER
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2189

DATE MAILED: 01/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/650,105

Applicant(s)

BREWER, TONY M.

Examiner

B. James Peikari

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The previous objection to the specification regarding the title is withdrawn due to the amendment filed on July 5, 2005.
2. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

3. The previous objections to claims 1, 5 and 6 are withdrawn due to the amendment filed on July 5, 2005.

**NOTE:** In the Appeal Brief filed on October 5, 2005, applicant stated unambiguously for the record that the claims are limited to monitoring a TLB purge *exclusively* by hardware. Note the following:

On page 7 of the Appeal Brief, applicant states:

"In the Advisory Action mailed July 26, 2005, the Examiner states that claim 1 is 'nowhere limited to strictly hardware operation.' Appellant respectfully disagrees."

On page 8 of the Appeal Brief, applicant further states:

“Appellant respectfully asserts that one of ordinary skill in the art would understand that certain embodiments of the invention operate in environments in which data movement is performed largely by hardware *and/or environments in which data movement is provided entirely by hardware*” [emphasis added].

While the examiner does not agree that the claims are limited to monitoring a TLB purge *exclusively* by hardware, in the event that the Board of Appeals and Interferences or any other court determines that the applicant’s remarks in the Appeal Brief or elsewhere serve to limit the present claims to monitoring a TLB purge *exclusively* by hardware, or if the claims are determined to be limited to monitoring a TLB purge *exclusively* by hardware for any other reason, then the following rejections under 35 USC § 112 apply.

As stated in the final Office action mailed on May 5, 2005, “should applicant attempt to amend the claims to include such language, the issue of enablement would arise based on the above-cited citations from the specification”. Because applicant has attempted to limit the claims by argument rather than by amendment, this Office action must be made *non-final* (i.e., it is neither necessitated by applicant’s amendment of the claims nor based on information submitted in an information disclosure statement filed during the period set forth in 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p)).

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-4 and 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

According applicant, the claims are limited to monitoring a TLB purge *exclusively* by hardware. However, such a limitation in claims is not enabled by the specification, in which monitoring a TLB purge operation is implemented in *both* software and hardware. The software basis is admitted by language that falls short of “exclusively” on page 1 of the specification, “The invention is operable in an environment in which data movement is performed *largely* by hardware” (emphasis added), and on page 11 of the specification, “Under the claimed invention, data movements operations are enabled *almost* exclusively using hardware” (emphasis added). In fact, software usage is admitted through the entirety of page 18, for example.

Applicant has noted in the Appeal Brief, page 8, filed on October 5, 2005 that:

“the present invention ‘enabled in hardware rather than software’. See page 13, lines 7-14. See also page 10, lines 1-5 (performing operations integral to data movement with hardware rather than software); page 52[*sic*], lines 1-5 (optimizing aspects of data movement operations by performing functions on hardware rather than software).”

However, none of general phrases “phases and aspects”, note page 11, lines 8-14 of the specification, or “operations integral to data movement”, cited above, or “aspects of data movement operations”, cited above, enable monitoring a TLB purge *exclusively* by hardware.

Page 18 of the specification explicitly states:

“**TLB Purge Abort Enable** field (bit z6)-Enables an operation to be aborted if a TLB purge transaction is detected prior to or during the operation. In system operation, software sets and clears the bit. It should be set by software when a virtual address is being used. Note that the operation is aborted prior to starting if the TLB Purge Seen and TLB Purge Abort Enable bits are set at the time the messaging and copy state machine starts the operation. Completion status for an aborted operation is written to the appropriate status queue. The TLB Purge Abort Enable bit is written by a CSR write and read by a CSR read. Reset clears the bit.

**TLB Purge Seen** field (bit 27)-Indicates that a TLB purge transaction was detected by an EPAC. The bit is cleared by software and set by hardware.”

Note that this is *not* paraphrased. This is taken directly from applicant’s own specification. Note further that the TLB Purge Seen bit is part of the scheme to monitor a TLB purge transaction and that the bit is cleared by *software* and set by hardware.

The other part of the scheme to monitor is the EPAC. As described on page 10, the EPAC employs a state machine 153 to help with the notification phase of data movement. A state machine is any device that stores the status of something at a given time and can operate on input to change the status and/or cause an action or output to take place for any given change. A computer is basically a state machine and each machine instruction is input that changes one or more states and may cause other actions to take place. Each computer's data register stores a state. The read-only memory from which a boot program is loaded stores a state (the boot program itself is an initial state). The operating system is itself a state and each application that runs begins with some initial state that may change as it begins to handle input. Thus, at any moment in time, a computer system can be seen as a very complex set of states and each program in it as a state machine. In practice, however, state machines are used to develop and describe specific hardware or software interactions. The specification does not limit state machine 153 to either hardware or software. However, despite applicant's dismissal of the relevance of pages 38-39 to TLB operations, the EPAC employs two input command registers for messaging and data copy and pages 38-39 explicitly describe the *software* interface for the messaging and data copy hardware.

Thus the two elements noted in the monitoring of the TLB purge operations, the TLB Purge Seen bit and the EPAC itself, have *both* been shown to operate with software. Consequently, monitoring a TLB purge *exclusively* by hardware is not enabled.

**NOTE:** If, however, the Board of Appeals and Interferences or any other court determines that the present claims are *not* limited to monitoring a TLB purge *exclusively* by hardware, then the following rejections under 35 USC § 102 apply. These rejections are repeated from the previous Office action.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

7. Claims 1, 4 and 12 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Wu et al., 5,906,001.

With regard to claim 1, Wu et al. teach the claimed invention as background art with a method for controlling virtual memory translation (*i.e., address translation, note*

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*the use of a translation lookaside buffer throughout Wu et al.)* during data movement operations (*i.e., data transfers*) enabled in a hardware environment, comprising the steps of:

monitoring, as a hardware operation, for an occurrence of a translation lookaside buffer (TLB) purge (*note column 2, lines 33-54, which describe a less common way of monitoring using snooping as well as a more common way of monitoring using propagation of a shutdown operation*) during setup and execution of a data movement operation from virtual memory (*note that all transfers and other programming instructions are halted from execution*), and

upon detection of a TLB purge (*i.e., invalidation a TLB entry, note column 2, lines 10-29*) prior to completion of the data movement operation, aborting the data movement operation (*note the use of the "INT" instruction to interrupt and halt all microprocessor operations, column 2, lines 50-59 and lines 64 et seq.*) pending reestablishment of accurate virtual-memory-to-physical-memory mapping (*note column 2, lines 60-63*).

With regard to claim 4 and the data movement operation being a data copying operation, "copying" is a generic term of art that is used for both reading and writing. Thus, the scope of this claim encompasses all data transfers and thus would have been taught by the language "executing programming instructions" in column 2 of Wu et al.

With regard to claim 12, column 1, line 60, to column 2, line 29, describes how the TLB purge is triggered by a change ("due to a modification by an operating system or software routine") in the memory mapping.

### ***Double Patenting***

8. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

9. Claims 1-17 are rejected under the judicially created doctrine of double patenting over claims 1-10 of U. S. Patent No. 6,668,314 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

10. Claims 6-11 and 15-17 are rejected under the judicially created doctrine of double patenting over claims 12-16 of U. S. Patent No. 5,966,733 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

### **Remarks**

11. It is noted that:

(a) *Wu et al. teaches this operation being implemented in software and in hardware.* Applicant has already noted the software citations. The hardware includes the elements that run the software, the buses or lines upon which the detection is occurring and, of course, the TLB upon which any purge occurs.

(b) *Applicant's operation is also implemented in both software and hardware.* The hardware implementation has already been included in applicant's claim. The software basis is, however, admitted by the language which falls short of "exclusively" on page 1 of the specification "The invention is operable in an environment in which data movement is performed *largely* by hardware" (emphasis added) and on page 11 of

the specification "Under the claimed invention, data movements operations are enabled *almost* exclusively using hardware" (emphasis added). In fact, software usage is admitted through the entirety of page 18, for example.

Thus, it is clear that the applicant's operations are not *entirely* or *exclusively* hardware based, thus rendering moot any arguments to this extent. Applicant has repeatedly argued that "monitoring, as a hardware application" is equivalent to "monitoring, exclusively as a hardware operation". The examiner disagrees.

12. It is further noted that:

(a) Page 8, lines 1-3, of the amendment filed on July 5, 2005 states that "Wu does not teach monitoring as a strictly hardware operation as required by claim 1". However, claim 1 is nowhere limited to STRICTLY hardware operation. As currently written, claim 1 includes in its scope any such monitoring that uses at least some hardware.

(b) None of the "numerous examples of embodiments of the present invention 'enabled in hardware rather than software'" noted on page 8, lines 12-13, of the remarks of the amendment filed on July 5, 2005 have been included in the claims. Rather, the claims are broadly directed to "monitoring, as a hardware operation", when it is clear from the specification that such "monitoring" involves both hardware AND software.

(c) Although there may be some very particular aspects of applicant's disclosure that are performed by hardware that prior art systems performed in software, these have not been included in any of the claims. The remarks make several

references to the specification, but plainly ignore the heavy reliance on software.

Software is utilized throughout applicant's disclosure. For example, applicant remarks have not addressed the reliance on software for applicant's TLB monitoring and messaging that is clearly stated on page 18 or pages 38-39.

***Allowable Subject Matter***

13. As stated in the previous Office action, it is clear that there *are* specific actions (i.e., "phases or aspects", note page 11 of the specification) of TLB purge monitoring that are actually performed in hardware in ways that are not shown in the cited references, however, the claims do not include such distinctions. Claim 1 should specify exactly what is and what is not performed by hardware, with regard to the specific steps of the TLB purge monitoring.

Claims 2 and 3 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims and upon the submission of timely filed terminal disclaimers in compliance with 37 CFR 1.321(c) to overcome the double patenting rejections.

Claims 5-11 and 13-17 would be allowable upon the submission of timely filed terminal disclaimers in compliance with 37 CFR 1.321(c) to overcome the double patenting rejections.

***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Peikari whose telephone number is (571) 272-4185. The examiner is generally available between 7:00 am and 7:30 pm, EST, Monday through Wednesday, and between 5:30 am and 4:00 pm on Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim, can be reached at (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center at 866-217-9197 (toll-free).

15. In view of the Appeal Brief filed on October 5, 2005, PROSECUTION IS HEREBY REOPENED. A new grounds of rejection is set forth above.


To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

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(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

  
12/27/05  
MANO PADMANABHAN  
SUPERVISORY PATENT EXAMINER



B. James Peikari  
Primary Examiner  
Art Unit 2189  
12/25/05